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**CENTER FOR NAVAL ANALYSES**

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## FRENCH NUCLEAR FORCES IN THE 1980s AND 1990s

French nuclear forces are undergoing a significant transformation in the 1980s and 1990s. The current force is small and is capable of limited target coverage against Soviet territory and against Warsaw Pact forces invading western territory. By the mid-1990s, the new force structure will be theoretically capable of inflicting massive destruction against the Soviet Union as well as inflicting significant damage against Warsaw Pact military targets in eastern Europe.

The French do not make a fundamental distinction between strategic and tactical nuclear weapons. Tactical nuclear weapons would be used primarily as a clear warning to the Soviet Union that France would be willing to use her strategic weapons against Soviet territory if the Soviets failed to terminate the war. French tactical nuclear weapons are not postured to contribute to NATO's strategy of Flexible Response.

The French are upgrading both the strategic and tactical elements of their nuclear arsenal. The major change on the strategic dimension involves the MIRVing of French SLBMs, which will increase by six-fold the number of warheads carried by the SSBN force. The major change on the tactical dimension is the creation for the first time of a French force clearly designed to operate against Warsaw Pact military targets

in Eastern Europe rather than against Warsaw Pact forces invading Western territory.

#### I. CURRENT FRENCH NUCLEAR FORCES

French strategic forces now consist of three "complementary" systems:<sup>1</sup> six squadrons of strategic bombers, two squadrons of land-based intermediate range ballistic missiles (IRBMs) and five strategic nuclear submarines. Prime Minister Pierre Mauroy has described the interactive quality of these three systems in the following manner:

Right now, France's nuclear strategic forces are based on three complementary components: the Mirage IV aircraft whose flexibility of employment gives the administration possibilities of making certain moves in crisis management; the ground-to-ground missiles on the Albion plateau which, by virtue of their characteristics and positions on national territory, force an adversary to launch a major attack in order to destroy them which would indicate the adversary's intentions; the missile-firing nuclear submarines which, by virtue of their invulnerability on the open sea and the permanent threat they constitute, regardless of what happens, represent a second-strike capacity which turns national territory into a sanctuary.<sup>2</sup>

The current French nuclear force structure is shown in table 1 below.

TABLE 1

## FRENCH NUCLEAR FORCES, 1983

Delivery mode	Weapon system		Range (km) (Hi-lo-hi profile)	Warhead type	Payload
	Number	Type			
Aircraft, land-based:					
Strategic bombers	34	Mirage IVA	1,500	AN-22	70 kt.
Tankers	11	KC 135	--	--	--
Tactical strike	45	Jaguars	720	AN-52	15 kt.
Aircraft	30	Mirage IIIEs	800	AN-52	15 kt.
Land-based Missiles:					
IRBMs	18	S3	3,000	single	1 mt.
SRBMs	42	Pluton	120	single	15- 25 kt.
Sea-based:					
Carrier-based aviation	36	Super Etendards	650	AN-52	15 kt.
SSBN (5)	80 (16 each)	M-20	3,000	single	1 mt.

Sources: *The Military Balance, 1982-83 (IISS)*; *Connaissance de l'Histoire* (July-August 1980).

The Mirage IV was the first element of the French strategic forces to become operational.<sup>3</sup> The first Mirage IVs went into service in October 1964 and by 1966, 42 were in service. This bomber can reach deep into Soviet territory only with the aid of mid-air refueling by means of the KC-135s that France purchased from the U.S. in the mid-1960s.

The Mirage IV has undergone several modifications during its service life. Originally designed as a high-altitude bomber, the Mirage IV was subsequently adapted for a low-level role with minor modifications. The Mirage IV has been further modified by the

incorporation of advanced electronic-countermeasures equipment to improve the Mirage's capability to penetrate Soviet air defenses.

The Mirage IV carries a payload of two 70-kiloton bombs (the AN-22). These bombs are stocked at the nine bases used by the *Forces Aeriennes Strategiques* (FAS). Although some of these bases are used only occasionally by the FAS, their dispersal throughout France requires an adversary to carry out a major strike to neutralize the air arm.

The second element of the French strategic "triad" is the small IRBM Force. The French first deployed IRBMs in 1971. From 1971 to 1980 the French deployed 18 S-2s. These were two-stage, solid-propellant missiles which carried a 150-kiloton warhead to a range of 2750 kilometers. The S-2 was replaced by the S-3 in 1980 and 1981. The S-3 is also a two-stage missile with greater payload (1 megaton) and range (more than 3,000 kilometers) than the S-2. The S-3 carries "...a hardened thermonuclear charge and a re-entry vehicle which is hardened also against the effects of a high altitude nuclear explosion from an ABM."<sup>4</sup>

The 18 S-3s are located on the Albion Plateau in Southeast France. This site was chosen because, in the words of the commandant of the F.A.S., "...of the terrain features which permit the building of missile silos, the low density of the population and the geographical

situation."<sup>5</sup> The 18 silos are grouped three to eight kilometers apart. Each squadron of nine is controlled by a single command post with the two command posts located 25 kilometers apart. The targets are, of course, pre-programmed into the missiles but can be changed in one minute for a single missile or in five minutes for all 18.<sup>6</sup> It would take up to 7 minutes after receiving the authorization to fire for all 18 missiles to be launched.<sup>7</sup>

The 18 IRBMs are considered to operate in wartime as indicators of the Soviet Union's intentions toward France. According to one French government report, "the Albion Plateau is vulnerable to a first strike. The *signature* of such an attack would, however, justify the use of the strategic nuclear forces against the aggressor."<sup>8</sup> It has been estimated that a 20-megaton attack would be necessary to destroy the Albion Plateau.<sup>9</sup> According to experts in the French Ministry of Defense the silos on the Albion Plateau can resist the explosion of a 1-megaton warhead at a distance of 500 meters from the silo.<sup>10</sup>

The third and most important element of the "triad" is the strategic submarine force. The French currently deploy five *Redoutable* class SSBNs. Since January 1983, they have kept three of their five SSBNs on station at all times.<sup>11</sup>

The *Redoutable* carries 16 SLBMs or as the French call them *Mer Sol Balistique Strategique* (MSBS). The first MSBS was the M-1 which was initially tested in 1964. The M-1 went into service in 1971 but was phased out in favor of the M-2 in 1974 which by 1977 had itself been supplanted by the M-20. The first *Sous-marin Nucleaire Lanceur d'Engins* (SNLE) or SSBNs were the *Redoutable* and *le Terrible*, which entered service in 1971-73, armed with sixteen M-1 missiles. In 1974 *le Foudroyant* introduced the M-2, followed by the *l'Indomptable*. All four SSBNs, have since been rearmed with the M-20 MSBS. A fifth boat, *le Tonnant*, was launched in 1976, and she received the M-20 missile in 1980. The life cycle for these five SSBNs is shown in table 2 below.

TABLE 2  
ESTIMATED LIFE CYCLE FOR DEPLOYED FRENCH SSBN FORCE

<u>Name of submarine</u>	<u>Number</u>	<u>Laid down</u>	<u>Operational</u>	<u>Approximate end of operational life</u>
Le Redoutable	S611	1964	1971	1991-1996
Le Terrible	S612	1967	1973	1993-1998
Le Foudroyant	S610	1969	1974	1994-1999
L'Indomptable	S613	1971	1977	1997-2003
Le Tonnant	S614	1974	1980	2000-2005

Source: *Jane's Fighting Ships*, 1979-80 (London: Macdonalds and Janes, 1979), p. 18.



In addition to providing a thermonuclear warhead, the M-20 program also introduced improved aids to penetration of anti-missile defenses. A number of technical improvements were also made to enhance the range, flight envelope and rate of firing of the missile system.<sup>12</sup>

Prior to January 1983 (when the French increased the number of French SSBNs on patrol from two to three) an authoritative French source indicated that the operational cycle for each SSBN was more than 200 ship days.<sup>13</sup> There were two sea patrols of 9 to 10 weeks each per SSBN on an annual basis with a 4-week period of physical reconditioning at the submarine base at Ile Longe (near Brest) in Northwestern France. Each SSBN is served by two alternating crews. French submariners do an average of four patrols during their service on SSBNs. Several French naval officers have been on as many as 12 patrols.

The *Redoutable* class SSBN displaces 8,000 tons surfaced and 8940 tons submerged. It attains a speed of 20 knots surfaced and 25 knots submerged. It carries a crew of 135 men (15 officers and 120 servicemen), 16 SLBMs and 18 torpedoes. The reactor is a natural-water-cooled type using enriched uranium. The reactor drives two twin turbines and two turbo-alternators. It has a diving depth of 900 feet under normal operating conditions.<sup>14</sup>

The *French Oceanic Strategic Force* (FOST) consists of the five operational SSBNs, an experimental submarine, (*le Gymnote*) the operational base at Ile Longe, and a number of command posts and signaling stations.<sup>15</sup> The ALFOST (Admiral in charge of the FOST) operates from a command post 10 kilometers northwest of Paris (at Houilles). Very-low-frequency (VLF) transmission links are used to communicate directly from Houilles to Rosnay in Northwestern France. The antennas in this system are vulnerable to a potential attack, but ALFOST has the ability to use other low-frequency (LF) or high-frequency (HF) channels for communication.<sup>16</sup> One French source has described the communication system with the SSBNs as follows:

Communications with the SNLE's are normally one-way: the SNLE has to remain entirely mute so as not to risk revealing its position, while it continually receives operational or personal messages. The FOST command, in its PC--protected against nuclear attack--at Houilles in the Yvelines, possesses for these communications its own radio-transmission network, with the Kerlouan station, near Brest, and the Rosnay (Indres) station, specially designed for communications with the submerged SNLE's. This Rosnay station, which cost about Fr 280 million, is equipped with two very-long-range (about 9,000 kilometers) 580-kW transmitters. It uses very-low-frequency (14 to 23 kHz) transmission by "surface waves" that propagate in the ground and in water (to a depth of about 10 meters). To pick up these transmissions, the SNLE's trail a special antenna with an underwater float on the end of it.<sup>17</sup>

The decision to use the strategic forces can be made only by the French Chief of State (see figure 1 below). The command and control system operates through several key links. The *Centre Operationnel de*

*la Defense Aerienn*e (C.O.D.A.) identifies the existence of an imminent attack. This threat assessment is conveyed to the *Centre de Operations des Forces Aeriennes Strategiques* (C.O.F.A.S.) located at Taverny which in turn informs the President. When the decision to execute a strategic strike has been made, the C.O.F.A.S. sends operational orders to the two command posts at the Albion Plateau and to the Mirage IV bomber squadrons. In addition, ALFOST is ordered to execute an SLBM attack. He does so through the operations center at Houilles which communicates directly with the SSBNs on patrol.<sup>18</sup> One French source has indicated the following procedure for executing a strategic submarine attack.

To enable the president of the republic to put the FNS (Strategic Nuclear Force) into action, the FOST ensures that direct liaisons between the President and the nuclear submarines are permanently available. For his part, in order to fulfill his operational and organic responsibilities, the admiral commanding the Strategic Naval Force has a number of command posts and signaling stations.

The main command post is installed in a protected zone of the Commandant Mille Center, at the junction of the communes of Houilles and Carrieres-sur-Seine, old quarries that the German Navy had used as a shop for assembling submarine torpedoes. It is installed in a specially protected concrete structure. The other command posts are located with the commanders-in-chief for the Atlantic and for the Mediterranean.

The command posts have the role of elaborating different information and transmitting it to the submarine--in particular, intelligence about foreign forces at sea, obtained especially because of the presence of the French air and naval forces in all theaters. The different CP's (Command Posts) are linked to the various signaling stations, one of which is at Rosnay in the Indre.<sup>19</sup>

Currently, the French rely primarily on land links to connect the strategic decision-makers.<sup>20</sup>

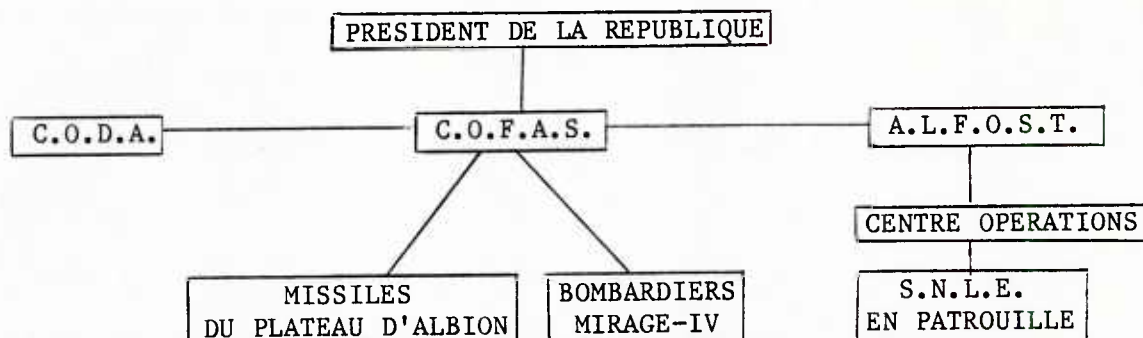


FIG. 1: STRATEGIC FORCES CHAIN OF COMMAND

Source: *Le Monde*, May 19, 1980.

If the French used the current strategic force, how much destruction could it wreak? One French governmental report released in 1980 indicated that the French strategic forces have the capability of killing 20 million Soviets and wounding an equivalent number. According to this report:

On the basis of the effects of the strike made against the city of Hiroshima, the combined strike delivered by three submarines, nine S-3 missiles, and 37 Mirage IV aircraft (assuming that all our equipment is available and that all our warheads hit their targets) would be capable of causing the death of 20 million individuals, wounding an equivalent number, plus major disorganization of enemy nationwide activities.<sup>21</sup>

It should be noted that France currently deploys 18 S-3 IRBMs and 34 Mirage IV bombers, rather than the 9 S-3s and 37 Mirage IVs assumed in the report.

In addition to the strategic force, the French deploy a small tactical nuclear force. The components of this force as well as their purpose are indicated by an authoritative French publication as follows:

The tactical nuclear forces are an indispensable complement to the strategic forces. The tactical nuclear warhead is the same for the three services--the AN-52 bomb is carried by Pluton missiles in the ground forces, by the Mirage IIIE and the Jaguars in the Air Force and by the Super Etendard in the Naval Air Force. These weapons can be used against forces engaged in the zone of combat or in the rear of the combat zone. Tactical nuclear weapons are important in enhancing the conventional ground and Air Forces. They provide these classical forces with considerable firepower. They exercise a major impact simply by the threat of their use in conjunction with the conventional battle. Because the tactical weapons are weapons of deterrence their use can be decided upon only by the highest national authority, the head of state. Their use is a key political action by which France is advertising in advance its resolve to use strategic weapons.<sup>22</sup>

The tactical forces make primary use of the AN-52 warhead which is evaluated to have a 15-kiloton capability. There is an alternative warhead available--primarily for the Pluton--which has a 25-kiloton capability (the AN-51). The AN-52 would be employed for use near to the main battle area whereas the AN-51 is intended for use in an enemy's rear.<sup>23</sup>

The Pluton short range missile was first deployed in 1974. Currently there are 42 Pluton launchers deployed in five regiments. The Pluton launchers are capable of reloading and can be prepared to fire a second time within less than 30 minutes. The weapon has a range capability of up to 120 kilometers with a 150-300 meter CEP depending upon range. The Pluton is installed on and fired from the AMX-30 tank chassis with the missile container being used as a launcher ramp. The missile and warhead are supplied separately to units in the field. When field deployed, the Plutons in each regiment are dispersed throughout the terrain more than 15 kilometers apart. The target can be set three minutes before firing.<sup>24</sup>

The deployment of the Pluton with French conventional forces has the advantage of impeding the adversary from massing his forces. Nonetheless, the presence of the Pluton forces the conventional forces to commit assets to defending the Pluton, rather than contributing to the conventional military effort. Also, the Pluton's short range means that it would be used only against Warsaw Pact forces already occupying West German territory.

The French tactical land-based aircraft would be used primarily in conjunction with the Plutons in attacking invading Warsaw Pact forces in West Germany. The French currently deploy 45 Jaguars and 30 Mirage IIIs to carry out the tactical nuclear ground attack mission. The three squadrons of Jaguars and two of Mirage IIIs could, however, be used to

carry out strikes at the enemy's rear given the 720 kilometer combat range of the Jaguar and the 800-kilometer combat range of the Mirage III.<sup>25</sup>

In addition, the two French aircraft carriers currently have 36 Super Etendard Strike Aircraft available for a tactical nuclear strike mission. The *Clemenceau* was refitted in 1978 to accommodate tactical nuclear weapons. The *Foch* underwent a similar retrofit from July 1980 to August 1981. Each aircraft carrier can carry 40 aircraft and will receive additional Super Etendards in the future. Sea-based tactical air provides the French with a nuclear strike force against either land-based or naval targets. An authoritative French publication has indicated the roles for this component of the strike force in the following words:

(This force)...gives the government the means to deal with an aggressor threatening national territory from the sea, it multiplies the axis of attack against the enemy's forces of invasion by providing the possibility of conducting strikes from the sea...and it assures the government of the possibility of resisting an adversary's nuclear blackmail during a major maritime crisis affecting the vital interests of the nation."<sup>26</sup>

The last role implies that the French have in mind the possibility of adversaries other than the Soviets, notably a Third World nuclear power which might attempt nuclear blackmail against France.



The role of the three components of the tactical nuclear arsenal--ground, land-based and sea-based air--is to provide enhanced credibility to the strategic deterrent. Prime Minister Mauroy has underscored the relationship between strategic and tactical nuclear weapons as follows:

Despite permanent adaptation and modernization, strategic nuclear deterrence may turn out to be insufficient itself or it may be outflanked. To prevent this outflanking, the nuclear strategic forces must be joined by the conventional forces which have been upgraded with tactical nuclear weapons. The purpose of tactical nuclear weapons thus is to restore deterrence on the strategic level. Its employment would signify the determination of the President of the Republic to go all the way and, if necessary, to resort to the use of nuclear weapons aimed at the population. This does not mean that tactical nuclear weapons should be used to win a battle but instead, with the help of these tactical nuclear weapons, in a credible fashion to brandish the strategic nuclear threat if an armed conflict should in spite of everything be triggered by the aggressor in the European theater.<sup>27</sup>

The French are modernizing each element of their nuclear deterrent, strategic and tactical, precisely to enhance the credibility of both. It is to this modernization program to which I now turn.

## II. THE FRENCH NUCLEAR MODERNIZATION PROGRAM

The French government recently passed its most recent 5-year military plan. The Military Program Law for the 1984 to 1988 period is the fifth such document promulgated in France since 1960. The Military Program Law provides a framework for strategic planning which is a good



guide to French intentions as well as a realistic indicator of future military capabilities. The projected nuclear force modernization is drawn from this five year plan as well as from public discussion of the plan preceding and following its promulgation.<sup>28</sup>

The French plan a significant enhancement of the sea-based strategic deterrent. Two additional SSBNs are to be added to the FOST while at the same time almost the entire SSBN force will be fitted or retrofitted with MIRVed SLBMs.

The first SSBN to be added to the FOST will be *L'Inflexible* in 1985.<sup>29</sup> The *Inflexible* is a modification of the *Redoutable* class SSBN. The *Inflexible* will be the first French SSBN to carry a MIRVed SLBM (the M-4). This 16-tube SSBN is expected to be in service until 2012.

The second SSBN to be added to the FOST will be a completely new class of SSBN. According to Defense Minister Hernu, the new class of SSBN will be able to operate at greater depths, will be quieter and will be encased in a more effective type of metal hull than the current class of SSBN. It is also hoped that this new SSBN will carry a new generation of MIRVed SLBM (the M-5).<sup>30</sup> This new SSBN class is expected to be operational in 1994 with a service life extending until 2020. It is also possible that this SSBN will carry more than the 16 tubes that the current generation of SSBN does.

The two new SSBNs when added to the current force of five will give the French seven SSBNs. But this will not be a seven-boat force for long. At best, given the accuracy of French estimates that the "seventh" or new generation SSBN would come on line in 1994, it would do so only 3 years before the scheduled retirement in 1997 of the original Redoutable class SSBN. Although the government refers to the new generation SSBN as the "seventh" submarine, it would be more accurate to describe it as the sixth operational SSBN as does a recent French Senate report.<sup>31</sup>

The French are unlikely to deploy more than six or seven SSBNs in any case. The current base at Ile Longe can support no more than seven SSBNs. To add more SSBNs would require the construction of a second base, an action which is financially prohibitive. In addition, the French Navy is a medium-sized professional force which operates surface as well as submarine forces. To increase the numbers of submarines would require the French Navy to draw down its surface missions given manpower and fiscal constraints. Also, adding more SLBM tubes in the context of the MIRVing trend would take France beyond a minimum assured destruction force, something the French simply do not wish to do.

The first French SLBM capable of carrying multiple warheads will be the M-4. The M-4 is a three-stage SLBM. While the first stage has a metal casing, the other two motors have casings wound of Kevlar material produced in the United States.<sup>32</sup> The M-4 program began in earnest in

1974. Initially, the M-4 was to carry three warheads not capable of being independently targeted. But the M-4 when deployed in 1985 will carry six warheads (150 kilotons each) which are capable of being independently targeted.<sup>33</sup> The M-4 has a much improved range over the M-20. The range is generally described as being more than 4,000 kilometers but one authoritative report indicates "that under certain conditions its range is nearly 6,000 kilometers."<sup>34</sup> Another French source has indicated that the 6,000 kilometer range is attained when less warheads are carried by the SLBM.<sup>35</sup> A much less authoritative report speculated that the M-4 in one test had a CEP of 300 meters fired at maximum range.<sup>36</sup> The M-4 has a 20-minute flight time with a peak altitude of 800 kilometers to target. "The spacing of the warheads at the end of the propelled flight is calculated to disperse the warheads in such a way so that the explosion of an anti-missile weapon is not able to destroy more than one warhead at a time."<sup>37</sup> The warheads of the M-4 have been "rendered as little sensitive as possible to electronic countermeasures and anti-missile missiles."<sup>38</sup>

The increased range of the M-4 is of major significance to the FOST. The 4,000-kilometer minimum range allows the FOST to strike Moscow from the Norwegian Sea while the 6,000-kilometer maximum range would allow it to operate outside of the Greenland-Iceland-United Kingdom Gap while still threatening Moscow. Another possibility is the

use of the waters close to French shores as a bastion to protect French submarines against Soviet ASW efforts.

The M-4 will be first deployed on the *Inflexible* when it becomes operational in 1985. In addition, "the general design of the M-4 was defined by the necessity of introducing the operational innovations but without extensively modifying the structure of the existing SSBNs."<sup>39</sup> An extensive retrofit program is planned in which all but the original *Redoutable* class SSBN will carry M-4s.<sup>40</sup> The M-4 retrofit program is shown in the chart below.

TABLE 3  
M-4 RETROFIT PROGRAM

<u>SSBN</u>	<u>Operational with M-4s</u>	<u>End of SSBN service life</u>
Le Tonnant	1987	2008
L'Indomptable	1989	2004
Le Terrible	1990	1999
Le Foudroyant	1992	2002

The new class of SSBN which is to become operational in the mid-1990s is designed to carry a new generation of SLBM, the M-5. This SLBM will carry at least six warheads and will be spin-stabilized to improve its ability to penetrate ballistic missile defenses.<sup>41</sup> A major French concern throughout the SLBM modernization program has been and will

continue to be to ensure the capability of its SLBMs to penetrate Soviet ABM defenses. As French Army Chief of Staff, General Lacaze, noted, "This significant augmentation of our numbers of weapons is necessary throughout the next 20 years in order to allow us to deal with the danger which will be presented by the development of ABM systems of the new generation."<sup>42</sup>

The numbers of SLBM warheads will jump dramatically in the next 10 years. Currently, the FOST has a maximum number of 80 SLBM warheads available. By the mid-1990s approximately 600 warheads will be available at a maximum for target coverage (see table 4 below).

TABLE 4  
FRENCH SLBM WARHEADS

	<u>1983</u>	<u>1985</u>	<u>1987</u>	<u>1989</u>	<u>1990</u>	<u>1992</u>	<u>1994</u>
Warheads on M-20 SLBMs	80	80	64	48	32	16	16
Warheads on M-4 SLBMs	-	96	192	288	384	480	480
Warheads on M-5 SLBMs	-	-	-	-	-	-	96+
Total warheads	80	176	256	336	416	496	592

Although the expansion of the striking power of the FOST is the most significant element of the French strategic modernization effort, there are plans to deploy a mobile land-based IRBM as well. The SX is currently under development and is expected to be deployed in 1996. The

SX will be road-mobile and will be dispersed in times of crisis to enhance its survivability.<sup>43</sup> The SX will have a 3,000- to 4,000-kilometer range which would allow the SX to reach targets in the Soviet Union almost up to the Urals. Both the transporter-erector-launchers (TELs) and the missiles will be designed to have the capability of being transported by air.<sup>44</sup> The deployment figures for the SX have not yet been announced.

The SX will replace the Mirage IV force which will be retired by 1996.<sup>45</sup> It is not, however, clear whether the SX is replacing the fixed-site IRBMs. It has been announced that the 18 S-3s will remain in service until 1996, but the French government has never linked SX deployment with S-3 retirement.<sup>46</sup> If the government considers the function of the Albion Plateau really to be to provide in part the "signature" of Soviet attack then the fixed-site IRBMs may be kept in service albeit modernized. Because the S-3 is a version of the M-20, it could be expected that a land-based version of the MIRVed M-4 would be a logical follow on system.<sup>47</sup>

In addition to a significant increase in their strategic nuclear striking power, the French also plan to create--really for the first time--a tactical nuclear force capable of attacking military targets in Eastern Europe. There will be two prongs to the French tactical nuclear force in the future--the Hades ground-launched missile and the ASMP air-launched missile. The two prongs will be combined under the direction

of a single tactical nuclear command placed directly under the French Chief of Staff.

The Hades will replace the Pluton. It has a longer range (350 kilometers) and a larger warhead (20 to 60 kilotons) than the Pluton.<sup>48</sup> The French plan to deploy four or five squadrons of Hades with the first squadron to be operational in 1992.<sup>49</sup> One report indicates that each Hades TEL will carry two missiles and that as many as 100 TELS will be deployed.<sup>50</sup> The Hades will also be capable of carrying an enhanced radiation or neutron warhead although the political decision on whether to do so has not yet been made.<sup>51</sup>

The increased range of the Hades allows it to be deployed on French national territory where it will be able to strike military targets in East Germany or Czechoslovakia. It appears that the French envisage striking fixed military targets such as airfields, C<sup>3</sup> facilities or geographical choke points with this weapon.<sup>52</sup> The Hades, in other words, unlike the Pluton will strike military targets in Eastern Europe rather than Western Europe. Clearly, West German sensibilities on the issue of French tactical nuclear weapons have been taken into account. One French newspaper report, hence, referred to the Hades as the "diplomatic missile."<sup>53</sup>

The deployment of the Hades has an important impact on French conventional military forces as well. One French government report went

so far as to characterize the new tactical ground forces as being "decoupled" from the operations of the conventional forces.<sup>54</sup> Whereas the conventional forces would currently use the Pluton as a key element of its operations in West Germany, the conventional forces, due in part to the retirement of the Pluton, will be left to operate in closer cooperation with NATO forces in fighting Warsaw Pact forces.<sup>55</sup>

A good description of the changes in the conventional military situation created in part by the Hades deployment has been provided by Jacques Isnard of *Le Monde*.

Officials in the Elysee Palace as well as in the Ministry of Defense believe that technological advances expected in certain weapon systems--the Hades nuclear missile and antitank helicopters--make it possible to reconcile two objectives that have long seemed contradictory. French Army combat forces stationed on both sides of the Rhine are currently organized essentially into two (or three) corps consisting of a total of seven (or eight) armored divisions reinforced by infantry divisions, and serving as a screen for five nuclear artillery regiments....The tank's relative mobility and the Pluton's 120-kilometer range give these combined forces, known as the First Army, capabilities that actually leave a potential enemy guessing about the geographical limits within which these forces may be committed.

But in reality it's either one thing or the other. Either the chief of state, wanting to fulfill his obligations to the Alliance, decides to move his First Army forward--including Pluton units which move along with it--into West German territory. At the same time, he must require his allies to give him sufficient advance notice to assemble the French forces. And above all, he must agree to delegate to subordinate commands authority to fire missiles dispersed throughout the combat area, and this at the risk of impairing the national strategy of deterrence



which implies centralized launching of an immediate and massive retaliatory strike. Or else, this same chief of state decides to defend solely the national sanctuary in the--almost neutralist or isolationist--belief that France's vital interests stop at the Rhine. In so doing, he deviates from his obligations to the Alliance at the risk of having to withdraw into France without fighting--if he has the time--the three French armored divisions stationed in the FRG.<sup>56</sup>

The deployment of the Hades will change the situation because there will be no need to move the Hades into West Germany to support French First Army operations in Central Europe. In addition, the French are creating separate antitank helicopter forces or a rapid action force of 47,000 men.\* The mobility of these forces would enable them to advance and to meet an attack toward West Germany's eastern borders. According to Isnard, deployment of the Hades and the formation of the rapid action force will create a more flexible situation for French decision makers.

Deployment and disposition of these forces can be tailored, as the chief of state sees fit, to all major contingencies, whether it be that the First Army is still not up to full strength and is being manned, equipped, and prepared to intervene, or even whether it be that there are no plans to commit that field army in the immediate future, in which case the Hades missiles are aimed, from positions in France and under French command, at enemy targets so as to support the counteroffensive by allied forces in Central Europe.

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\* The French are planning to reduce their military manpower by 35,000 over the next five years. French officials have justified the plans to reduce the size of the Armed Forces by presenting them as part of a modernization that will increase the Army's firepower and mobility.

The threat of Hades employment can thus be divorced from operational engagement of the First Army--a radically different posture from the one allowed by the Pluton missile--thereby enhancing the credibility of France's engagement alongside its allies from the very first moment of a crisis or conflict. At the same time, this posture increases the enemy's perplexity about French intentions.<sup>57</sup>

The second prong of the French tactical nuclear modernization program is the ASMP or the French version of the U.S. SRAM.<sup>58</sup> The ASMP can attain a speed of Mach 3 and has a range of 100 kilometers at low altitude (300 kilometers at high altitude). It has a preprogrammed inertial guidance system. Most sources indicate that ASMP will carry a 100- to 150-kiloton warhead, although Defense Minister Hernu has indicated that it will carry a 300-kiloton warhead.<sup>59</sup> The French appear to have plans for a follow-on to the ASMP. They plan to develop an attack missile (the ASLP) with longer range and improved guidance capability.<sup>60</sup>

The ASMP will be carried by three airborne platforms.<sup>61</sup> Eighteen Mirage IVs will be fitted with ASMPs in the mid-1980s and will remain in service until the SX is deployed. Presumably, these Mirages will be given strategic missions. In addition, the ASMP will become the main nuclear armament of the Mirage 2000N force which will be deployed in the 1980s and 1990s. The French plan to replace the current force of Mirage III's and Jaguars by 85 Mirage 2000Ns by the early 1990s (36 by 1988 and 49 after 1988). The Mirage 2000N has a longer range than the Mirage III (one-third more) and improved avionics (a look-down, shoot-

down capability). The ASMP will also be carried by the Super Etendard aircraft aboard the two aircraft carriers. Forty-three Super Etendards will be armed with the ASMP by 1988 with 10 additional planes to be so armed after 1988.

The Hades plus the ASMP will be under the direction of a newly created tactical nuclear command.<sup>62</sup> This command is placed directly under the chief of staff of the Army. The creation of this new command coupled with the ability to operate tactical forces solely on French territory clearly increases the ability of decision makers to control the use of these weapons.

The new tactical weapons deployments are clearly associated with the view that France's so-called vital interests extend beyond the strict confines of its geographically defined borders. Defense of the national "sanctuary" is concomitant with participation in a geographically well-defined alliance. For example, General Lacaze directly linked the Hades-ASMP programs with the defense of France's European partners as well as of France herself.<sup>63</sup>

The planned transformation of France's strategic and tactical nuclear forces is summarized in table 5 below.

TABLE 5

## TRANSFORMATION OF FRENCH NUCLEAR FORCES, 1980s-1990s

1983	1988	Early to Mid-1990s
5 SSBNs with M-20s	+1 SSBN +1 SSBN retrofit with M-4	1 SSBN with M-20 5 SSBNs with M-4s 1 SSBN with M-5s
18 SS-3s	no change	MIRVed IRBMS?
34 Mirage IVs	18 Mirage IVs with ASMP	100 SX IRBMS
42 Plutons	no change	100 Hades
36 Super Etendards	+7 Super Etendards (all 43 with ASMP)	53 Super Etendards with ASMP
45 Jaguars 30 Mirage IIIs	+36 Mirage 2000Ns with ASMP	85 Mirage 2000Ns with ASMP

In addition to the increased firepower of their nuclear forces, the French plan to enhance the credibility of their deterrent by other means as well. The French ASW capability will be enhanced by the deployment of six additional nuclear attack submarines by 1992. The first French SSN became operational in 1982 and the second began sea trials in 1981.<sup>64</sup> The French will also deploy 16 second-generation "Atlantique" maritime patrol planes that will be available to provide SSBN protection.<sup>65</sup> The French are also planning to enhance their C<sup>3</sup> systems with the deployment of four airborne platforms for the ASTARTE system which is designed to transmit orders in conditions of severe electric magnetic pulse caused by high altitude thermonuclear explosions.<sup>66</sup>

General Lacaze argued that the ASTARTE program is as important as building additional SSBNs in enhancing the credibility of the French nuclear deterrent.<sup>67</sup> Finally, there are plans to improve the reconnaissance capability of the French forces in part by developing a military observation satellite, the SAMRO, which will be operational in the early 1990s. The SAMRO will be launched by the European Space Programs Arienne Rocket.<sup>68</sup> It appears the SAMRO will be used to provide better target coverage for French nuclear forces.<sup>69</sup>

### III. THE TRANSFORMATION OF FRENCH NUCLEAR FORCES

The French nuclear forces will be significantly enhanced both quantitatively and qualitatively by the modernization program. The most dramatic quantitative increase will be in submarine warheads whereby the current force of 80 M-20s will be replaced in the mid-1990s by a mixed force of 480 M-4s, at least 96 M-5s and possibly 16 M-20s. This represents nearly a six-fold increase.

An additional measure of the quantitative increase is shown by the expansion in potential target coverage by the French nuclear forces. Table 6 below shows a five fold increase in potential target coverage by the strategic forces with a more modest increase in coverage by the tactical forces of less than 100 additional targets. These figures are only rough approximations, however, because of incomplete data about the new systems characteristics and uncertainty about final deployment figures.

TABLE 6

## POTENTIAL TARGET COVERAGE BY FRENCH NUCLEAR FORCES

	<u>1983</u>	<u>Mid-1990s</u>
Sea-based strategic	80	592
Land-based strategic	52	100 <sup>a</sup>
Total strategic	132	692
Land-based tactical <sup>b</sup>	117	185
Sea-based tactical	36	53
Total tactical	153	238
Total potential target coverage	285	930

<sup>a</sup>Assuming deployment of 100 SX and the complete phasing out of land-based IRBM.

<sup>b</sup>Assuming the Pluton will be unable to fire its reload.

Much more impressive is the improvement in the quality of the projected French nuclear force structure. The SLBM force will have greater range which in turn enhances the survivability of French SSBNs. They can operate either in a bastion near France or much further from the European continent. The IRBM force will become more survivable with the deployment of the SX and will be given greater range as well. The tactical forces will have greater range, payload and survivability. The Hades has three times the range of the Pluton, more than double its payload and does not have to operate on West German

territory. The ASMP program coupled with the Mirage 2000N deployment increases the payload (by three to ten times) and the survivability (by not having to fly directly over the target) of the French tactical Air Force dedicated to the nuclear mission. Table 7 below provides some sense of the qualitative improvements in the force structure expressed in terms of the range and payload of those forces.

TABLE 7  
RANGE AND PAYLOAD OF FRENCH NUCLEAR SYSTEMS

<u>Weapon system</u>	<u>Range</u>	<u>Payload</u>
SLBMs:		
M-20	3000 Kms	1 Mt.
M-4	4000-6000 Kms	150 Kt.
M-5	unknown	unknown
IRBMs:		
S-2	2,750 Kms	150 Kt.
S-3	3,500 Kms	1 Mt.
SX	3000-4000 Kms	unknown
Strategic bombers:		
Mirage IVA	1500 Kms combat range <sup>a</sup>	1 x AN-22, 70 Kt. bomb
Tactical ground systems:		
Pluton	120 Kms	15-25 Kt.
Hades	350 Kms	20-60 Kt.
Tactical air systems:		
Jaguars	720 Kms <sup>a</sup>	2 x AN-52, 15 Kt. bombs
Mirage IIIEs	800 Kms <sup>a</sup>	2 x AN-52, 15 Kt. bombs
Mirage 2000N	1200 Kms <sup>a</sup>	100-300 Kt.
+ ASMP	+ 100 Kms	
Super Etendard	720 Kms <sup>a</sup>	2 x An-52, 15 Kt. bombs
+ ASMP	+100 Kms	100-300 Kt.

<sup>a</sup>Combat radius with normal payload and flight profile (hi-lo-hi) without refueling but with external fuel tanks.

Source: International Institute of Strategic Studies.

A very important change is in the synergistic nature of the relationship between the tactical and strategic forces. To the extent that France is able to enhance the survivability of its SSBN force it turns its national territory into a "sanctuary". This in turn increases the significance of the French tactical nuclear arm. The Soviets are not in a position to preempt the French tactical nuclear forces--to be located solely on French soil--without the threat of massive retaliation by the SSBN and IRBM force against Soviet cities. The tactical nuclear forces in turn enhance the credibility of the strategic forces. Even if the Soviets have some degree of confidence in reducing the level of damage to be expected from a French strategic response, they have to be concerned with the efficacy of a massive French tactical strike against their forces in Eastern Europe. Such a strike might well lead to Soviet defeat on the European battlefield.

In short, the French are engaging in a significant nuclear modernization program. They are increasing the numbers of targets which can be covered on Soviet territory. The nature of targets covered on the European battlefield are changing as well. They are building a force structure potentially more in tune with West German interests and an extended deterrence capability. The Soviets are already noting these changes and it is to be hypothesized that their warfighting approaches and arms control policies will be increasingly affected by them. The French nuclear forces, thus, will become a more significant factor in Soviet calculations toward Europe in the next decade.



## NOTES

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3. The information on the Mirage IV has been taken from the following source: "Les Forces Nucleaires Francais," *Connaissance de l'Histoire* (July-August 1980), pp. 37-50.
4. *Jane's Weapon Systems*, 1981-1982 (London: Jane's Publishing Co., 1981), p. 3.
5. "Les Forces Nucleaires Francais," p. 49.
6. This information is taken from *Ibid.*, pp. 52-57.
7. *Christian Science Monitor*, July 19, 1983, p. 9.
8. *Rapport Fait an Nom de la Commission de la Defense National et des Forces Armees* (Paris: Assemblee Nationale, May 18, 1983), p. 49.
9. *Le Monde*, May 23, 1980.
10. *Le Nouveau Journal*, May 23, 1980. See also, *New York Times*, May 9, 1983, p. E-9.
11. *Le Monde*, December 13, 1982.
12. "The French Navy's SSBNs" *Defence*, vol. 12, No. 8 (August 1981), p. 561.
13. Captain Cazenave, *Cols Bleus* (October 2, 1982), pp. 5-8.
14. "Les Forces Nucleaires Francaises," pp. 18-27.
15. *Armees d'Aujourd'hui* (July-August 1982), p. 8.
16. "Les Forces Nucleaires Francaises," pp. 18-27.
17. Paul Antony, "FOST", *La Recherche* (October 1981), p. 1151.
18. *Le Monde*, May 19, 1980.
19. Captain Cazenave, *Cols Bleus*, p. 8.
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21. *Le Monde*, October 26-27, 1980.
22. *Armees d'Aujourd'hui* (July-August 1982), p. 8.
23. *Jane's Weapon Systems*, 1981-1982, p. 42.
24. The material in this and the following paragraph was taken from *Ibid* and "Les Forces Nucleaires Francaises," pp. 6-9.
25. "Les Forces Nucleaires Francaises," pp. 28-32.
26. *Armees d'Aujourd'hui* (July-August 1982), p. 16.
27. Pierre Mauroy, "La Coherence d'une politique de defense," p. 14.
28. See *Project De Loi Portant de La Programmation Militaire pour les annees 1984-1988* (Paris: Assemblée Nationale, April 21, 1983); *Rapport de la Commission de la Defense Nationale; Rapport fait au nom de la commission des affaires etrangeres, de la Defense et des forces Armees sur le projet de loi...programmation militaire pour les annees, 1984-1988* (Paris: Senat, June 9, 1983).
29. *Le Matin*, June 24, 1982.
30. *Le Monde*, December 6, 1981.
31. *Rapport de la commission des affaires etrangeres*, p. 19.
32. *Jane's Weapon Systems*, 1981-1982, p. 4.
33. According to the Director of the Ballistic and Space Division of Aerospatiale, the six M-4 warheads are capable of being "...guided independently to distinct targets or arriving spaced at a single target." *Air et Cosmos*, June 11, 1983, p. 105.
34. *Rapport de la Commission de La Defense Nationale*, p. 50.
35. *Air et Cosmos*, June 11, 1983, p. 105.
36. *Le Figaro*, December 4, 1980.
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39. Paul Antony, "FOST," p. 1152.
40. *Le Monde*, June 24, 1982.
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49. *Rapport de la Commission de la Defense Nationale*, p. 5.
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51. *Le Matin*, January 16, 1981; *Le Monde*, April 22, 1983.
52. *Rapport de la Commission de la Defense Nationale*, p. 83.
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57. *Ibid.*
58. *Aeronautique et l'Astronautique*, No. 6 (1981); *Jane's Weapon Systems*, 1981-1982, p. 154.
59. *Le Monde*, November 22-23, 1981.
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61. *Project de loi*, pp. 14-15.
62. *Rapport de la Commission des Affaires Etrangeres*, pp. 28-29.
63. General Lacaze, "Politique de Defense," p. 17.

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65. *Rapport de la Commission de la Defense Nationale*, pp. 59-60.
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67. General Lacaze, "Politique de Defense," p. 15.
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